Ocular Screening System

A NASA-sponsored application engineering project, designed to meet a need for a low-cost method of vision examination, has resulted in successful development of an ocular screening system based on aerospace technology and formation of a company—Medical Sciences Corporation (MSC), Wedowee, Alabama—to provide screening services. The system was jointly developed by Marshall Space Flight Center and Dr. Joe Kerr, now president of MSC. Several Alabama ophthalmologists served as medical consultants on the project.

Evaluated in field tests of more than 5,000 subjects prior to pre-market authorization by the Food and Drug Administration, the screening system photographically records the reflective properties of the inner and outer parts of both eyes simultaneously. From this information, it is possible to determine whether a person has normal eyes, is near-sighted or far-sighted, has cataracts or any other problems related to the optical properties of the eyes. Capable of testing an individual in three minutes, the system is designed for safe, convenient screening of large groups. Its major advantage is greater sensitivity than the traditionally-used eye chart. For example, in a test of 1,657 Alabama children, only 111 failed the chart test but the MSC system found 507 abnormal conditions; these abnormalities were verified by ophthalmological follow-up.

The system's key element is a photorefractor that consists of a 35-millimeter camera, a telephoto lens and an electronic flash. At upper right, Dr. Joe Kerr is pointing the photorefractor toward a subject peering through a head positioning hood located 13 feet from the camera (lower photo). The flash sends light into the subject's eyes and the light is reflected from the subject's retina back to the camera lens. The photorefractor analyzes the retinal reflex generated by the flash and produces an image of the subject's eyes in which the pupils are variously colored; the nature of a defect, where such exists, is identifiable by a trained observer's visual examination of the pupils.

The ocular screening system is portable, rugged, requires no maintenance and provides consistently interpretable results. MSC has designed motorized vans, housing a screening system and a small computer, for conducting tests at schools, industrial plants, military bases or civic organizations. The film and the computer disc—which contains subject data and image identification—are shipped to MSC's Wedowee headquarters for analysis and coordination. Results of a test are sent to the subject in five days.